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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/510,502	10/07/2004	Hengliang Zhang	FUKAP0101US	1564
43076 7590 06/19/2007 MARK D. SARALINO (GENERAL) RENNER, OTTO, BOISSELLE & SKLAR, LLP 1621 EUCLID AVENUE, NINETEENTH FLOOR CLEVELAND, OH 44115-2191			EXAMINER DOERRLER, WILLIAM CHARLES	
			ART UNIT 3744	PAPER NUMBER
			MAIL DATE 06/19/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

Application No.

10/510,502

Applicant(s)

ZHANG ET AL.

Examiner

William C. Doerrler

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 24 May 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1 and 4-9 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 October 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Priority*

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marshall (2,083,611) in view of Pierce (4,321,421).

Marshall discloses applicants' basic inventive concept, a thermosyphon heat loop with the vapor led from the top of the chamber container the object being cooled and the liquid being sprayed over the top of the object being cooled (see figure 3), substantially

as claimed with the exception of elevating the condenser. Pierce shows an elevated condensing section (tubes 20) which returns condensed liquid to the evaporator section through gravity. It would have been obvious to one of ordinary skill in the art at the time of applicants' invention from the teaching of Pierce to modify the thermosyphon cooling system of Marshall by using gravity to distribute the liquid to avoid the requirement of a pump and the energy to run the pump. In regard to claim 3, the pipe 22 from the condenser of Pierce is shown to be smaller than the entrance for vapor, thus having increased flow resistance. The shape of the high temperature source which is being cooled, is seen as a matter of intended use. As the system of Marshall or Pierce may be used to cool any shape, this limitation is seen as met by the references.

Claims 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marshall in view of Pierce, as applied to claims 1 and 3 above, and further in view of Jones.

Marshall, as modified, discloses applicants' basic inventive concept, a thermosyphon which drops condensed coolant on the top of the curved surface to be cooled (see figures 4 and 7), substantially as claimed with the exception of using a loop type thermosyphon with controls to restrict fluid flow. Jones shows these features to be old in the thermosyphon art. It would have been obvious to one of ordinary skill in the art at the time of applicants' invention from the teaching of Jones to modify the thermosyphon of Marshall by using a loop type system with means to control fluid flow to improve control over the heat transfer. In regard to claim 5, the amount of fluid in a thermosyphon is well within the scope of an ordinary practitioner to ensure that desired

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heat transfer will take place. In regard to claims 6 and 7, Jones states in line 28 of column 4 that water can be used as the fluid in the pipes.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Marshall in view of Pierce as applied to claims 1 and 3 above, and further in view of DiPaolo.

Marshall, as modified, discloses applicants' basic inventive concept, a thermosyphon which drops the condensed fluid onto a heat source in the evaporator, substantially as claimed with the exception of using a mixture containing ethanol as the refrigerant.

DiPaolo shows this feature to be old in the paragraph 11. It would have been obvious to one of ordinary skill in the art at the time of applicants' invention from the teaching of DiPaolo to modify the thermosyphon of Marshall et al by using ethanol to provide efficient, safe heat transfer.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Marshall in view of Pierce as applied to claims 1 and 3 above, and further in view of Berchowitz et al.

Marshall, as modified, discloses applicants' basic inventive concept, a thermosyphon which drops the condensed fluid onto a heat source in the evaporator, substantially as claimed with the exception of using the thermosyphon to cool the heat rejection element of a Stirling cycle cooler. Berchowitz et al shows this feature to be old in the Stirling cooler art. It would have been obvious to one of ordinary skill in the art at the time of applicants' invention from the teaching of Berchowitz et al to modify the thermosyphon of Marshall by using it to cool the heat rejector of a Stirling cooler to ensure proper functioning of the Stirling cooler.

### ***Response to Arguments***

Applicant's arguments with respect to claims 1 and 3-9 have been considered but are moot in view of the new ground(s) of rejection.

Marshal shows a thermosyphon which cools a heat producing surface by dropping the condensed liquid on the top of the heat producing surface. The shape of the heat producing surface is not seen as effecting the functioning of the device. Pierce is relied upon to show using the elevation of the condenser to flow the liquid back to the evaporation chamber, which contains the heat producing device.

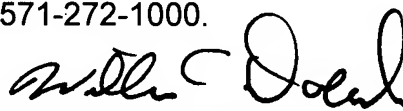
### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William C. Doerrler whose telephone number is (571) 272-4807. The examiner can normally be reached on Monday-Friday 6:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler can be reached on (571) 272-4834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



William C Doerrler  
Primary Examiner  
Art Unit 3744

WCD